More specifically, the end of the index line 204 intended to represent the liquid crystals has been moved to better show that the liquid crystals 204 are positioned between substrates 200 and 202, as described on page 1, lines 11-18. Approval of the proposed drawing change is respectfully requested.

Claims 1-3 stand rejected under 35 U.S.C. §102 (b) as being anticipated by United States Patent No. 5,459,410 to Henley. Applicants respectfully traverse this rejection.

Applicants respectfully submit that all of the features of the present invention are not disclosed in Henley. First, with regard to independent Claim 1, Henley fails to disclose a method for repairing a defect in a display that includes the step of "irradiating a multi-layer region" where that multi-layer region has been formed by "stacking a plurality of conductive layers with an insulation layer interposed between each of the conducting layers," and further where a "laser beam [is used] to selectively remove only an upper conductive layer of said multi-layer region, without removing any portions of the conductive layer, or layers, located below the portion of the upper conductive layer being removed," as defined in amended Claim 1.

Briefly, one example of an embodiment of the invention of Claim 1 is shown in Figures 5a-5c. Figure 5a shows an example of an inter-layer short circuit 290 between the drain bus line 220 and the gate bus line 218. These two conductive layers cross each other, so they define a multi-layer region with a plurality of conductive layers with insulation layers interposed therebetween (such as that exemplified in Figure 1c, which shows conductive layers 218 and 220 with an insulating layer 240 interposed therebetween). In order to repair

the short circuit, a laser beam is irradiated to form a slit (or slits) that isolate the short circuit, such as that exemplified by slits S1, S2 and S3 in Figures 5b and 5c. The slit (or slits) are formed by using a laser beam of a particular intensity such that it only removes the upper conductive layer, without removing any portions of the conductive layer (or layers) located below the portion being removed. Figure 1c shows the results of using a laser beam of this intensity, where the upper conductive layer 220 is removed, and the lower conductive layer 218 remains intact. Such a method provided a simple way of isolating an inter-layer short circuit, with relatively few process steps.

In contrast, the method disclosed in Henley does not selectively remove "only an upper conductive layer of said multi-layer region" (emphasis added). The method of Figures 11a and 11b of Henley relates to repairing a cut in a single conductive layer, and not a "multi-layer region" that was "formed by stacking a plurality of conductive layers with an insulation layer interposed between each of the conductive layers," as defined in Claim 1. Thus, for at least this reason, Figures 11a and 11b of Henley do not satisfy Claim 1.

Figures 12a-12c of Henley do appear to show a multi-layer region where a conductive data line crosses conductive gate line 15. However, to repair the short circuit formed between lines 13 and 15, line 15 is cut at portions 80 and 82, which are portions that only include a single conductive layer, and thus do not qualify as a multi-layer region "formed by stacking a plurality of conductive layers" (emphasis added), as defined in independent Claim 1. Thus, for at least this reason, Figures 12a-12c of Henley do not satisfy Claim 1.

With regard to Figures 13a and 13b of Henley, these figures also fail to show the claimed multi-layer region of Claim 1. Instead, these figures show a line-to-line short 90 formed between two adjacent single conductive layer lines. This short is repaired by simply cutting through the conductive path, which is formed by a single conductive layer (and not a plurality of stacked conductive layers). Thus for at least this reason, Figures 13a and 13b of Henley do not satisfy Claim 1.

Accordingly, for all of the reasons discussed above, Applicants respectfully request the withdrawal of this § 102(b) rejection of Claim 1 under Henley.

Second, with regard to independent Claim 2, Applicants respectfully submit that Henley fails to disclose all of the features of the method of repairing a defect in a display, as defined in amended independent Claim 2. More specifically, Henley fails to disclose the step of irradiating "a multi-layer region . . . to remove said plurality of conductive layers," where those conductive layers being removed are "stacked above each other," as defined in amended Claim 2.

One example of an embodiment of the present invention as defined in Claim 2 is shown in Figures 3a and 3b. These figures show an interlayer short circuit 290 that is positioned near the center of the multi-layer region defined where the gate line 218 crosses the drain line 220. To repair this short circuit, a laser beam of a particular intensity is irradiated such that the plurality of conductive layers are removed so that the short circuit does not remain. Figure 1e shows an example that shows the results of using a laser beam of this intensity, where both the upper conductive layer 220 and the lower conductive layer 218

are removed. As can be seen from a careful viewing of Figure 1e, there is no short circuit connection between stacked conductive layers 218 and 220. In contrast, if a laser beam of insufficient intensity is used, such as shown in Figure 1d, portions of the layers 218 and 220 may melt, without being completely vaporized, resulting in an unwanted electrical connection between layers 218 and 220. Accordingly, it is important that the proper intensity be utilized so that no inter-layer short circuit occurs.

In contrast, there is no disclosure in Henley of removing a plurality of conductive layers in a multi-layer region, where those layers are stacked above each other, as defined in Claim 2. As mentioned above, Figures 11-13 of Henley each only show cutting through a single conductive layer, and not through a plurality of conductive layers that are "stacked above each other," which is a feature defined in Claim 2. Accordingly, for at least this reason, Applicants respectfully request the withdrawal of this § 102(b) rejection of Claim 2 under Henley.

Finally, with regard to Claim 3, Applicants respectfully submit that Henley fails to disclose a method of repairing a defect in a display that involves forming a bypass of a gate bus line in which, *inter alia*, the bypass results in "sacrificing regular use of an associated pixel," as defined in amended Claim 3.

Briefly, one example of an embodiment defined by Claim 3 is shown in Figure 8, which relates to forming a bypass for a broken portion 292 of the gate bus line 218a. As described in the specification on page 22, line 5, through page 24, line 19, a bypass is created by forming several cuts (such as 310, 311, 312, 313, 314) and making several connections

(such as 316, 317, 318). Thus, in this embodiment, a bypass is created with a conductive path formed by the segment of the gate bus line 218a shown to the left of broken portion 292, source electrode 228a, pixel electrode 224a, an isolated portion 227 of the storage capacitor bus line 226a, an isolated portion 221 of the drain bus line 220b, and the segment of the gate bus line 218a that is to the right of broken portion 292. Accordingly, since the pixel electrode 224a is being used as part of the bypass, regular use of this pixel is sacrificed.

In contrast, Figures 11b and 12c of Henley merely show the creation of bypasses 78 and 88 by adding conductive films to the assembly, without any mention of using the pixel as part of the bypass. Nor is there any mention in Henley of "sacrificing regular use of an associated pixel" to create a bypass. Accordingly, for at least this reason, Applicants respectfully request the withdrawal of this § 102(b) rejection of Claim 3 under Henley.

Claims 4 and 5 stand rejected under 35 U.S.C. §102 (b) as being anticipated by United States Patent No. 5,303,074 to Salisbury. Applicants respectfully traverse this rejection.

First, Applicants respectfully submit that Salisbury fails to disclose all of the features defined in independent Claim 4. In particular, Salisbury fails to disclose a display that has a repair line for repairing a line breakage that has occurred in an "extraction wiring portion segment" of a bus line, where the extraction wiring portion segment of the bus line "is positioned between said display area segment [of the bus line] and said terminal portion segment [of the bus line]," and the repair line is connectable "at said display area segments

and said terminal portion segments, but not at said extraction wiring portion segments," as defined in amended Claim 4.

Briefly, one example of an embodiment of the present invention defined in Claim 4 is shown in Figure 11, which includes a repair line 400 and a plurality of bus lines 220. The bus lines 220 are divided into three segments: (1) a display area segment I; (2) an extraction wiring portion segment II; and (3) a terminal portion segment III. As can be seen in the Figure 11 example, a line breakage 404 has occurred in the extraction wiring portion segment (segment II) of one of the bus lines 220. To fix this breakage, areas 406 and 408 are irradiated to fuse the drain bus line 220 to the repair line 400. It should be noted that the areas 406 and 408 where the fusing takes place are located in segment I (the display area segment) and segment III (the terminal portion segment), and not in segment II (the extraction wiring portion segment).

In contrast, Figure 1 of Salisbury shows line breakages 40A and 40B that are located in what most closely resembles the display area segments of the bus line 14_1 (segment I), since this area is within the dashed line 12 that defines the display area. Thus, the line breakages 40A and 40B are not located in the extraction wiring portion segment of bus line 14_1, as defined in Claim 4. In addition, in Salisbury, the repair lines 30_2 and 30_3 do not include sections that are connectable at the display area segments, as defined in Claim 4, since the connections are made outside of the display area 12. Accordingly, for at least these reasons, Applicants respectfully request the withdrawal of this § 102(b) rejection of independent Claim 4.

Second, Applicants respectfully submit that Salisbury fails to disclose all of the features defined in independent Claim 5. In particular, Applicants respectfully submit that Salisbury fails to disclose a display with an auxiliary line that is formed along a bus line, where the auxiliary line and the bus line "each include a widened portion, wherein said widened portions are stacked to form a pad that is situated at an intermediate portion of said bus line," as defined in amended Claim 5.

Briefly, one example of an embodiment of the invention defined by Claim 5 is shown in Figures 25a and 25b, which includes, *inter alia*, a pad 608 that is formed by widened portions of the auxiliary line 500 and the bus line 220. As discussed in the specification on page 40, lines 6-26, such a widened pad minimizes the possibility that the auxiliary line 500 will be mistakenly cut when the bus line 220 (at the pad area) is irradiated. Such a pad is preferred over simply increasing the width of the entire line because increasing the width of the entire line increases the chances of an inter-layer short circuit, and it also increases the load attributable to the parasitic capacitance between the bus line and the common electrode.

In contrast, Salisbury fails to include the claimed stacked widened portions that form a pad, as defined in Claim 5. The feature that most closely resembles the claimed pad is the represented in Figure 2A of Salisbury by widened portions W1 and W3 near the end portion 135 (with similar widened portions shown near end portions 320, 325 and 327). However, these widened portions are located at the <u>end portions</u> of the bus lines 102 and 103. Thus, they are not "situated at an <u>intermediate portion</u> of said bus line," as defined in Claim

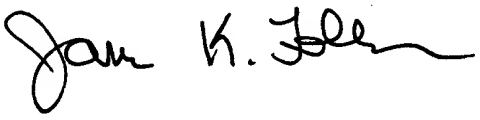
5. Accordingly, for at least this reason, Applicants respectfully request the withdrawal of this § 102(b) rejection of Claim 5.

Finally, Applicants have also added new Claims 6-12. Applicants respectfully submit that new Claims 6-12 are also allowable over the references of record.

For all of the above reasons, Applicants request reconsideration and allowance of the claimed invention. Should the Examiner be of the opinion that a telephone conference would aid in the prosecution of the application, or that outstanding issues exist, the Examiner is invited to contact the undersigned.

Respectfully submitted,

GREER, BURNS & CRAIN, LTD.



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

The paragraph beginning on page 1, line 11 has been rewritten as follows:

Fig. 30 shows an example of a configuration of an active matrix liquid crystal display. The liquid crystal panel has a structure in which two glass substrates, i.e., a TFT substrate 200 formed with TFTs (thin film transistors) and the like and a CF substrate 2042 formed with a color filter (CF) and the like are in a face-to-face relationship with each other and are bonded together with liquid crystals 204 sealed therebetween.

The paragraph beginning on page 2, line 14 has been rewritten as follows:

Referring again to Fig. 30, a gate driving circuit 206 loaded with driver ICs for driving the plurality of gate bus lines 218 and a drain driving circuit 208 loaded with driver ICs for driving the plurality of drain bus lines 220 are provided on the TFT substrate 200 which is provided in a face-to-face relationship with the CF substrate 2042 with the liquid crystals 204 sealed therebetween. Those driving circuits 206 and 208 output scan signals and data signals to predetermined gate bus lines 218 and drain bus lines 220 based on predetermined signals output by a control circuit 216. A polarizer 212 is provided on the surface of the TFT 200 opposite to the surface thereof on which the elements are formed, and a back-light unit 214 is attached to the surface of the polarizing plate 212 opposite to the TFT

substrate 200. A polarizer 210 in a crossed Nicol relationship with the polarizer 212 is attached to the surface of the CF substrate 2042 opposite to the surface thereof on which the color filter is formed.

The paragraph beginning on page 8, line 27 has been rewritten as follows:

The above-described object is achieved by a method for repairing defects of a display having pixel regions formed on a substrate, ~~comprises~~comprising the steps of irradiating a multi-layer region formed by stacking a plurality of conductive layers with insulation layers interposed with a laser beam and selectively removing only an upper conductive layer in the vicinity of the multi-layer region such that neither inter-layer short-circuit nor short-circuit in a single layer occurs in the multi-layer region.

The paragraph beginning on page 13, line 2 has been rewritten as follows:

A description will now be made ~~on~~of a method for repairing a defect in a display according to a first mode for carrying out the invention with reference to Figs. 1a through 7d. First, the method for repairing a defect according to the present mode for carrying out the invention will be schematically described with reference to Figs. 1a through 2. Components having the same functions and operations of those according to the related art shown in Figs. 30 through 33b will be indicated by like reference numbers and will not be described here.

The paragraph beginning on page 38, line 9 has been rewritten as follows:

As shown in Fig. 23b, the auxiliary line 500 is formed from the same metal as that used to form the gate bus lines on the TFT substrate 200 which is a glass substrate at the same time when the gate bus lines 218 are formed. The auxiliary line 500 forms a multi-layer structure in combination with the drain bus ~~liens~~lines 220 with a gate insulation film interposed therebetween, and it is electrically insulated from the drain bus lines 220 and is in an electrically floating state in which it does not work as it is.

In the Claims:

Claims 1-5 have been amended and new Claims 6-11 have been added as follows:

1. (Once Amended) A method for repairing a defect in a display having pixel regions formed on a substrate, comprising the step of:

irradiating a multi-layer region, formed by stacking a plurality of conductive layers with an insulation ~~layers~~layer interposed between each of the conductive layers, with a laser beam to selectively remove only an upper conductive layer~~in the vicinity~~ of said multi-layer region, without removing any portions of the conductive layer, or layers, located below the portion of the upper conductive layer being removed, such that neither inter-layer short-circuit nor short-circuit in a single layer occurs in said multi-layer region.

2. (Twice Amended) A method for repairing a defect in a display having pixel regions formed on a substrate, comprising the step of:

irradiating a multi-layer region, formed by stacking a plurality of conductive layers with insulation layers interposed therebetween, with a laser beam to remove said plurality of conductive layers, stacked above each other, in said multi-layer region such that no inter-layer short-circuit occurs.

3. (Once Amended) A method for repairing a defect in a display having pixel regions formed on a substrate, comprising the step of:

forming a bypass for a broken portion of a gate bus line by separating or connecting said gate bus line from or to a drain electrode or a source electrode of a TFT or a pixel electrode or a storage capacitor bus line which is formed with an insulation film interposed through local irradiation with a laser beam, thereby allowing said broken portion to be repaired by sacrificing regular use of an associated pixel.

4. (Once Amended) A display having a plurality of bus lines formed in a display area, comprising:

said plurality of bus lines each being defined by three segments, a display area segment, an extraction wiring portion segment, and a terminal portion segment, where said extraction wiring portion segment is positioned between said display area segment and said terminal portion segment; and

a repair line connectable to a plurality of extraction lines, at said display area segments and said terminal portion segments, but not at said extraction wiring portion segments, said repair line being configured for repairing a line breakage that has occurred in at least one of ~~an~~said extraction wiring portion segments. ~~extending between said display area and respective terminals for said plurality of bus lines.~~

5. (Twice Amended) A display having a plurality of bus lines formed in a display area, comprising:

an auxiliary line formed along said bus line in an extraction wiring portion via an insulation film for repairing a line breakage that has occurred at the extraction wiring portion;

wherein ~~a width of~~ said auxiliary line and said bus line each include a widened portion, wherein said widened portions are stacked to form a pad that is situated at an intermediate portion of said bus line. ~~is different from a width of said bus line.~~

6. (New Claim) A method for repairing a defect in a display having pixel regions formed on a substrate, comprising the step of:

forming a bypass for a broken portion of a gate bus line by forming an alternate conductive path through a pixel electrode, whereby regular use of an associated pixel is sacrificed.

7. (New Claim) The method according to Claim 6, further comprising the steps of:

creating a first electrically isolated line on a portion of a storage capacitor bus line, wherein said storage capacitor bus line is adjacent to said gate bus line, and further wherein said storage capacitor bus line is separated from said gate bus line by said pixel being sacrificed;

creating a second electrically isolated line on a portion of a drain bus line; and

forming said bypass by using local irradiation with a laser beam, said bypass consisting of a conductive path that includes a first edge of said broken gate bus line, a source electrode, said pixel being sacrificed, said first electrically isolated line, said second electrically isolated line, and a second edge of said broken gate bus line.

8. (New Claim) The method according to Claim 7, wherein said conductive path also includes a drain electrode that is positioned adjacent said second edge of said broken gate bus line.

9. (New Claim) A method for repairing a defect in a display having pixel regions, comprising the step of:

forming a bypass for a broken portion of a gate bus line by forming an alternate conductive path around a pixel electrode, whereby regular use of an associated pixel is sacrificed.

10. (New Claim) The method according to Claim 9, further comprising the steps of:

creating a first electrically isolated line on a portion of a first drain bus line that is adjacent to said pixel being sacrificed;

creating a second electrically isolated line on a portion of a storage capacitor bus line, wherein said storage capacitor bus line is adjacent to said gate bus line, and further wherein said storage capacitor bus line is separated from said gate bus line by said pixel being sacrificed;

creating a third electrically isolated line on a portion of a second drain bus line that is both adjacent to said pixel being sacrificed and located on an opposite side of said pixel being sacrificed than said first drain bus line; and

forming said bypass by using local irradiation with a laser beam, said bypass consisting a conductive path that includes a first edge of said broken gate bus line, said first electrically isolated line, said second electrically isolated line, said third electrically isolated line and a second edge of said broken gate bus line.

11. (New Claim) The method according to Claim 10, further comprising the steps of:

irradiating with a laser beam to form an additional cut on said first drain bus line to ensure isolation of first electrically isolated line; and

irradiating with a laser beam to form a second additional cut on said second drain bus line to ensure isolation of said third electrically isolated line.

12. (New Claim) A display having a plurality of bus lines formed in a display area, comprising:

an auxiliary line, formed along said bus line in an extraction wiring portion via an insulation film, for repairing a line breakage that has occurred at the extension wiring portion;

wherein a terminal end portion of said auxiliary line is electrically connected to a terminal end portion of bus line via contact holes, whereby repair of a broken portion of said bus line may be accomplished by using laser irradiation to make only a single additional electrical connection between said auxiliary line and said bus line.

FIG. 30

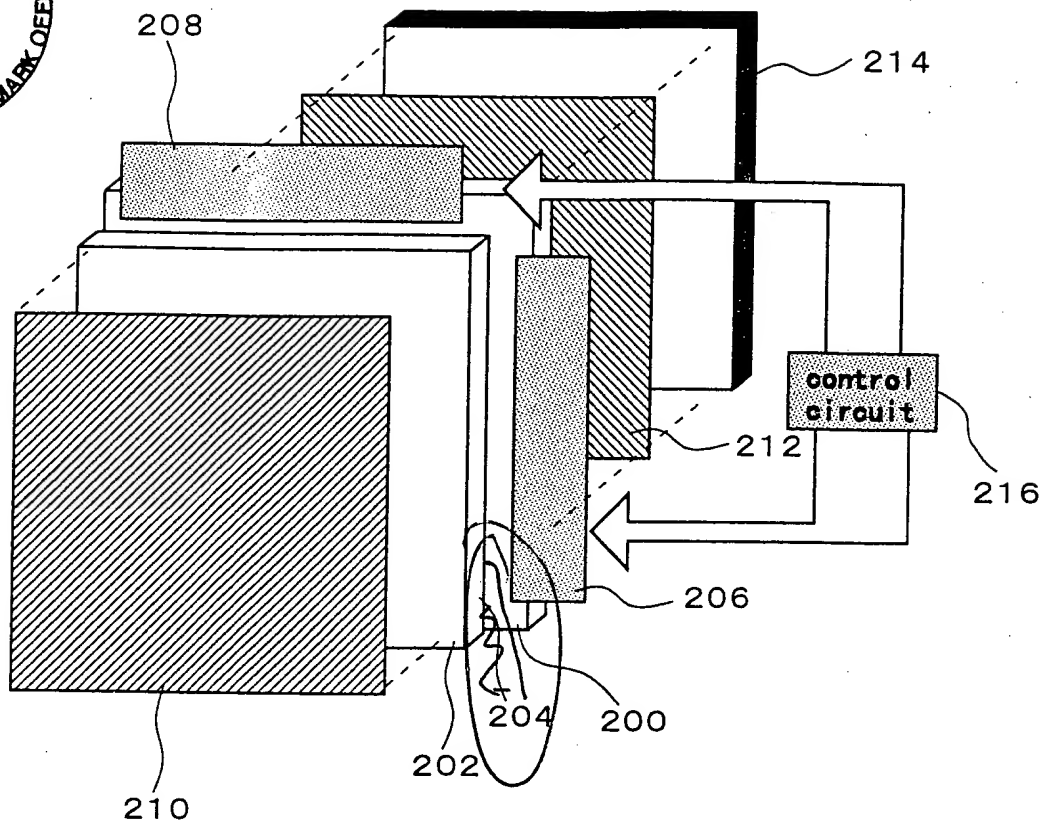

FIG. 31